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DIGITAL THERMOSTAT REFRIGERATION

F 200 / F 300
TSF 200 / TSF 300
M3

F 200 / F 300

M3

TSF 200 / TSF 300

User manual – Version 1.2
www.osakasolutions.com

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INTRODUCTION

In this manual are the information necessary for proper installation and instruction for use and maintenance of the product, it is recommended to read carefully and keep it.
To prevent erratic operation or malfunction of the THERMOSTAT that can create dangerous situations, damage to persons, things or animals, please remember that the facility must meet and be aware of the safety systems annexes necessary to ensure their safety.
OSAKA SOLUTIONS or their legal representatives are not responsible for misuse of THERMOSTAT or not conforming to the characteristics of the THERMOSTAT.

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1 – DESCRIPTION

1.1 – GENERAL DESCRIPTION

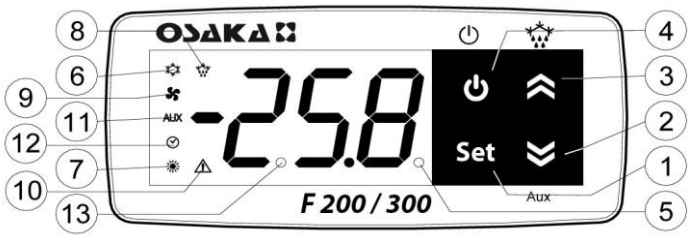
The **F 200 / F 300 / TSF 200 / TSF 300 / M3** are microprocessor digital thermostats, are suitable for refrigeration temperature with ON / OFF control and intervals time for defrost, to regulate temperature or continuous operating time compressor, electric heater or hot gas for investment cycle. The device is equipped with optimization functions and special defrosting functions used for energy saving control.

Thermostats, depending on the model, available from 2 to 3 relay outputs and 2 to 3 inputs for temperature sensors PTC or NTC and also an internal buzzer for acoustic signalling ALARM and programming.

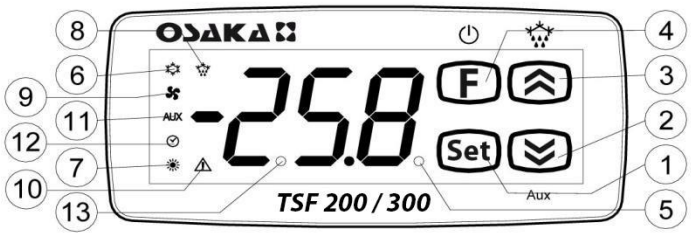
Models **F 200 / F 300 / TSF 200 / TSF 300 / M3** differ from other standard models on the design and screen system keyboard.

1.2 – FRONT PANEL DESCRIPTION

Front Panel F 200 / F 300



Front Panel TSF 200 / 300



Front Panel M3

1 – Key SET : Pressing and releasing quickly access the change set point.
Press for 5 seconds to enter the programming mode parameter.
This mode is used to edit the parameters and to confirm the value.
It can be used together with the UP key to change the level of programming parameters.
Pressing together with the UP button for 5 seconds when the auto keypad lock is active, the keypad automatically unlocks.

2 – Key DOWN / Aux : In the programming mode is used to decrease the value of the parameter to be programmed and the selection of parameters.
If "t.Fb" is programmed parameter allows pressing for 1 second (in the normal operating mode) allows some functions as selecting the ECO mode, activating the Aux output, etc.. (See Operating DOWN key).

3 – Key UP / DEFROST : In normal operating mode by pressing for 5 seconds to enable / disable a manual defrost cycle.
In the programming mode is used to increase the value of the parameter to be programmed and the selection of parameters.
Always in programming mode can be used with the SET button to change the level of programming parameters.
Pressing together with the SET button for 5 seconds when the keyboard is active, to unlock the keyboard.

4 - Key " ⏻ or "F" : Pressing and releasing quickly, allowing the device to display their variables (temperature measurement, etc.).
In the programming mode is used to exit the settings and return to normal operation.
If "t.UF" is programmed, allows pressing for 1 second (in the normal operating mode), On / Off (Stand-by) or other control functions, including activating the Aux output, etc.. (See operation ON / OFF key).

5 - Led SET : In normal operating mode is on when a key is pressed, as indicative that has been pressed down.
In the programming mode is used to indicate the level of programming parameters.

6 - Led OUTPUT - COLD : Indicates the status of the regulation output (compressor or control device temperature); output enabled (on), off (off), inhibited (flashing).

7 - Led OUTPUT - HEAT : Indicates the status of the regulation output (resistance or device temperature control) when the action of regulation is heating; output enabled (on), off (off), inhibited (flashing).

8 - Led DEFROST : Indicates the state of current defrost or dripping state (flashing).

9 - Led FAN : Indicates the output status evaporator fan. Enabled (On), disabled (off), inhibited (flashing).

10 - Led ALARM : Indicates the alarm status. Enables (on), off (off), delayed or memorized (flashing).

11 - Led AUX : Indicates the status of the Auxiliary output.

12 - Led CLOCK : Indicates that the internal clock is active. If you are in slow flashing indicates an error of the time (clock chip does not work). If the flashing is quick indicates that the clock battery is exhausted.

13 - Led Stand-By : Indicates that the computer is in Stand-By (Press Key ⏻ or "F" for 3 seconds or activate digital input).

2 - PROGRAMMING

2.1 - QUICK SELECTION SET POINT

Press the "SET" key and release, the display will show "SP" alternating control value.
To change the value, press "up" to increase value and "down" to descend.

If "**Up** or **Down**" key is held, quickly increases speed to help select a distant value.
After selecting the desired value, is confirmed by pressing "**SET**" or self confirm if no key is pressed past 10 seconds, turning the thermostat to normal operation.

2.2 - STANDARD PROGRAMMING PARAMETERS

If the Password parameter access is not enabled (default setting), press "**SET**" for 5 sec., The display will show the code that identifies the first parameter and the "**Up**" or "**Down**" button you can select the desired parameter.

After selecting the desired parameter, press the "**SET**" key and the value will be programmed to the desired parameter. This setting can be changed by pressing the "**Up**" or "**Down**" to the desired value. Press "**SET**" to confirm and store the value.

Returning to the "**Up**" or "**Down**" keys, is possible again select another parameter and modify it on.
To exit the programming mode: do not touch any key for 10 seconds or press the ⏻ or "**F**" key for 2 sec.

2.3 – PROTECTED PARAMETERS BY PASSWORD

The instrument has a parameter protection function with configurable password in the "**t, PP**" parameter.
In some cases, this password is very useful so that no improper handling on the computer, whether to enable the password, enter the desired number and password in the "**t, PP**" parameter and exit programming.

When the password is programmed, pressing "**Set**" for 5 seconds to enter the settings menu, the device displays the acronym "**rP**" and pressing "**Set**" show "**O**", then with buttons "**up**" or "**down**" puts the correct value of password code and press "**Set**" to proceed to access the programming parameters.
If the password is correct, the display will show the code of the first parameter. The password protection can be disabled with the "**t.PP**" = oF parameter.

Note: *If the password is lost to access the parameters, use the following procedure:*
*Turn off electrical power to the device and re-feeding while you press the "SET" button for 5 seconds. Access parameters will be taken and you could modify the "**t.PP**" parameter.*

2.4 – LEVELS OF PROGRAMMING PARAMETERS

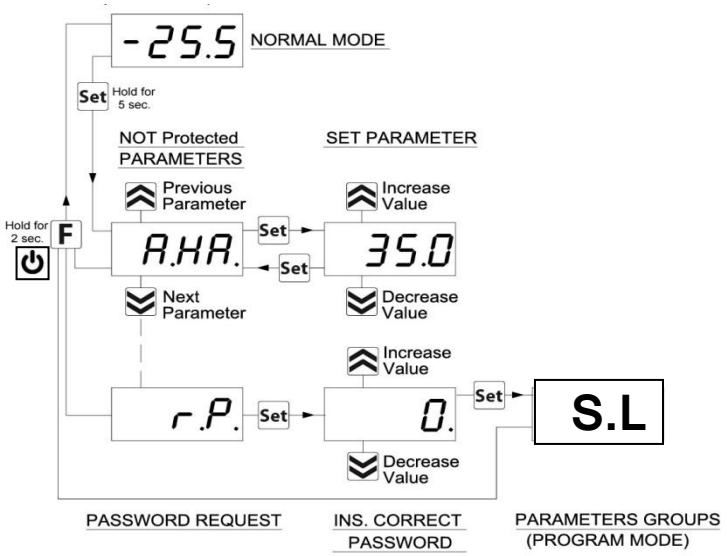
The equipment allows to password protect only certain parameters, and without password others, in order to let the user access to the

parameters needed, without access to all parameters that are specific of technical or machine manufacturer.
Method to select the level of programming parameters:

Access programming through password and select the parameter to be programmed without password. If the SET LED flashes means that the parameter is programmable only with password protected, and if the LED is fixed indicates that the parameter is direct access without password.
To modify the visibility level parameter jointly press "**Set + Up**" keys.

The LED Set will change status, indicating the new access level parameter (protected, flashing led) and (direct access without password, fixed led).

Upon entering the menu, the first parameters to visualize are user level parameters (unprotected) and then (protected) by entering the password when the computer shows "**rP**"



2.5 – RESTORE FACTORY SETUP PARAMETERS
The device has a mode parameter reset to factory programmed values.

To return to the factory settings or default values of the parameters is sufficient to activate the password protection and once activated when the display set "**rP**" enter the password **-48**.

After confirming the password with the SET button for 2 seconds display will show "**---**" when the computer performs the reset of the parameters, does a little testing and put all settings to default values.

2.6 - KEYBOARD LOCK FUNCTION
It is possible to completely lock the keys. Such a function is useful when the control is accessible to the public and you want to prevent tampering. The key lock function is activated by setting the "**t.Lo**" parameter to a value of OF.

The value set in parameter "**T.Lo**" is the time that the thermostat allows access to the keyboard and after passing this time the thermostat is locked.

Pressing any key displays the thermostat "**Ln**" to inform the lock is activated.

To unlock the keyboard press "Set + Up" for 5 sec., the display will show "**LF**" and all keyboard functions again become operational.

3 – WARNING FOR INSTALLATION AND USE

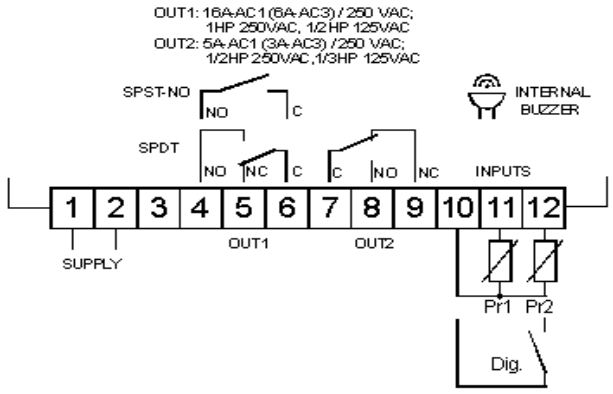
3.1 – PROPER USE
The devices are made as measuring and regulating equipment in accordance with EN **EN60730-**1 norm for operation up to an altitude of 2000 mts.
The use of equipment for standard applications not expressly provided in norm cited above, should provide all measurement and adjustments necessary protection.
The equipment must be adequately protected and away from liquids, dust, grease and dirt. They must be accessible only with the use of a right tool and safety system (except the front).
The devices can NOT be used in dangerous environments (flammable or explosive) without adequate protection.
It is recalled that the installer must ensure that the norm for electromagnetic compatibility is respected after implantation in the installation of equipment, eventually using the right filters if is needed.
In case of failure or malfunction of measuring and control equipment that can create dangerous situations or damage to persons, things, animals or products (defrost food or changes in their ideal state), it is recalled that the facility should be equipped with electronic devices or electromechanical safety and warning system.
They should be placed outside the measuring and control equipments, possible protective devices, responding to specific safety requirements that are covered by the norm of the product or suggest the common sense.
For your own safety, is highly recommended fulfilling the instructions provided above.

3.2 – MECHANICAL ASSEMBLY
The thermostats are designed for wall mounting or wall using the holes in the plastic and predisposed accessible after removing the front.
Once the equipment is installed is recommended to close the front cover.
Avoid placing the thermostat in place exposed to high humidity or dust, this can cause condensation or introduction of conductive particles or substances. Ensure that the computer has adequate ventilation and avoid installing indoor sealed boxes or areas where the temperature exceeds the specifications of the device. Avoid installing the cables and power supply together with the probe out and install equipment that can generate disturbances (electrical noise) as motors, fans, inverters, automatic gates, contactors, relays, solenoids, etc.…

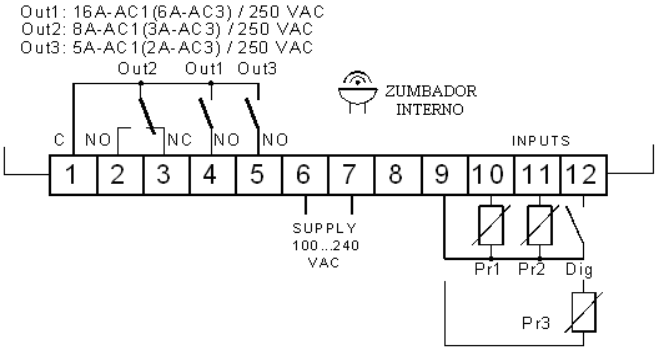
3.3 – ELECTRICAL CONNECTIONS
The thermostat is designed for permanent connection between devices, no switch is equipped with internal devices or power on over currents or voltages. It is therefore recommended to install a general safety thermal / isolator switch / device magneto device as close and easy access to cut if necessary, as a security . Are reminded that you must use appropriate cable to own isolation voltage, current, temperature and local electrical codes should also separate the signal cables from the power probe and power as far as possible in order avoid possible electrical noise, electromagnetic induction, which in some cases could be diminished or cancelled with RC filters, ferritic, supply, varistors, etc. ... the use of cables with antiparasitic mesh and this mesh is recommended to connect on one side to take ground.
It is recommended to check that the equipment settings are appropriate to the application before connecting wires actuators, loads on the output relays in order to prevent malfunctions or damage.

3.4 – ELECTRICAL WIRING DIAGRAM

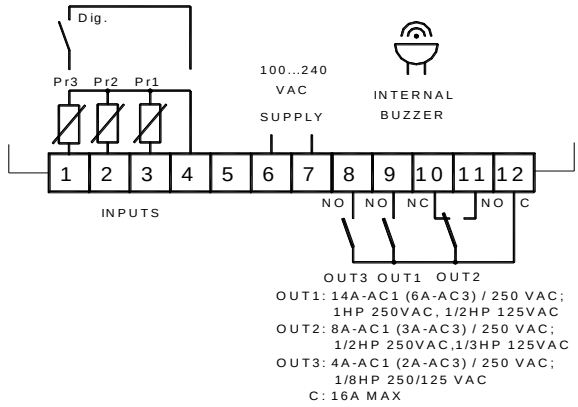
Wiring Schema F 200 y TSF 200



Wiring Schema F 300 y TSF 300



Wiring Schema M3



4 - OPERATION

4.1 – FUNCTION ON / STAND-BY

The thermostat, once fed, can make 2 states:
- ON: means that the driver is running and acting on the basis of planned control.
- STAND-BY: means that the control does not act, stop. (The display illuminates the LED Stand-by).

Moving from Stand-by to ON is exactly equivalent to when the device is connected to supply. If a power failure occurs when power returns, the system is always put in the condition that it was before the interruption.

Mode ON / Stand-by can be selected:
- Using the key ⏻ or "**F**" pressed for 3 sec Lets stop to change gear.
- Use the DOWN key for 3 sec If the par. "**T.Fb**" = 4
- Using the digital input if par. "**I.Fi**" = 10

4.2 – SETTINGS OF INPUTS PROBES AND DISPLAY

By the par. "**I.SE**" is selected if the probe you want to use is the type KTY81 PTC-121 (**Pt**) or NTC 103AT-2 (**nt**).

With the par. "**I.uP**" is selected if the unit of measure to use is the temperature in degrees Celsius (Standard) or Fahrenheit (USA) (**C0** = ° C / 1 ° (no decimal); **C1** = ° C / 0.1 ° (with decimal); **F0** = ° F / 1 °, **F1** = ° F / 0.1 °).
The unit allows the calibration of the probes, which can be used for recalibration of the equipment according to the needs of the application through the par. "**I.C1**" (Pr1 entry), "**i.C2**" (Pr2 entry).
The par. "**I.P2**" to select the use of Pr2 entry, as follows:
= EP - Evaporator Probe (EP): Evaporator probe Probe (EP): the probe functions as described below to control defrost and evaporator fans.
= Au - Auxiliar probe (Au)
= DG – Digital Input (dG)
If the Pr2 and / or Pr3 input is not used, program it as "**i.P2**" and "**i.P3**" = Of.
By the par. "**I.Ft**" it is possible to filter software on the extent of the value of the input, so we can reduce the sensitivity and rapid temperature change (rise time).
Through the par. "**I.dS**" you can set the normal display of the display may be the measure of Pr1 probe (P1), the measurement of the probe Pr2 (P2), the measure of Pr3 probe (P3) regulating the Set Point active (SP), or you can still have the display off (oF).
If you see one of the measures by the par ("**i.dS**" = P1, P2, P3) par. "**I.CU**" lets put an offset that is applied to display only the variable (**all regulatory controls are always made according to the correct parameter measurement calibration**).
Regardless of the value set in par. "**I.dS**" you can display all the measured variables and rotating operation by pressing and releasing the ⏻ or "**F**" key.
The display will show alternately the code that identifies the variable (see below) and its value.
The variables are as follows:
"**Pr1**" - Measuring probe Pr1
"**Pr2**" - Measuring probe Pr2
"**Pr3**" - Measuring probe Pr3
"**Lt**" - preset minimum temperature Pr1
"**Ht**" - Maximum temperature Pr1 memorized
The values of minimum and maximum peak Pr1 not saved to the lack of supply and may be reset using the DOWN key, pressing it for 3 sec. during peak viewing. After 3 seconds, the display will show "**---**" for a moment and tell cancellation and taken as maximum temperature measured at that time.
To exit the display mode of the variable will automatically in about 15 seconds after pressing the button ⏻ or "**F**".
Note that the display of the probe Pr1 can also change the display through the display lock function defrosting by the par. "**D.dL**" (see the function. "Defrost").

4.3 – DIGITAL INPUT SETUP

The Pr2/Pr3 input (**Pr2 in F200/TSF200 and Pr3 in F300/TSF300/M3**) can be configured as digital input voltage free contact. To use the digital input must be set par. (**"I.P2" = dG. On F200/TSF200 "i.P3" = dG. On F300/TSF300/M3**). The function for that dig input will be scheduled in the "**i.Fi**" parameter and the possible delay in the schedule "**i.ti**" parameter.
The "**i.Fi**" parameter or digital input can be programmed for:
= 0 – Inactive digital input (no function)
= 1 – Start defrost with contact normally open: on closing the input (and after time "**i.ti**") a defrost cycle is activated.
= 2 – End of defrost with contact normally open: on closing the input (and after the time "**i.ti**") the defrosting progress ends.
= 3 – Enabling Continuous cycle with contact normally open: on closing the input (and after the time "**i.ti**") activates a continuous cycle.
= 4 - Signalling of external alarm. When digital contact is closed and after the time set in "**i.ti**" the display will alternately **AL** with the measured temperature.
= 5 – Door opening with fan block with contact normally open: on closing the input (and after the time "**i.ti**") fan stop, device shows on display **Op** and alternating with the variable set in par. "**I.dS**". In this mode the action of the digital input is always active after the time set in par. "**A.oA**", after which the alarm is activated to signal that the door is open and the fan **OFF**.

= 6 – Door opening with fan and compressor blockade through normally open contact: similar to "**i.Fi**" = 5 but with fan and compressor block. Upon entering open door alarm also fan and compressor stops.
= 7 – Activating auxiliary output AUX with contact normally open: on closing the input (and after the time "**i.ti**") auxiliary output is activated as described in the operating mode "**i.Fo**" = 2 auxiliary output.
= 8 – Selecting the active set point **SP/SP2** with contact normally open: on closing the input (and after the time "**i.ti**") the set point temperature regulation "**SP2**" is activated. When the input is open the set point "**SP**" is active.
= 9 – Signalling of external alarm with disablement of all control outputs with contact normally open: At the end of the entry (and time "**i.ti**") comes off all control outputs, alarms are activated and the device displays on your display alternately **noF** and the variable set in the variable torque. "**I.dS**".

= 10 – On / Off (Stand-by) device using normally open contact: the closure of the input (and after the time "**i.ti**") the instrument turns **ON** but when opened becomes **standby** mode.
= 11 – **SP/SP2** active set point selection and change of action (**H-C**) with contact normally open: on closing the input (and after the time "**i.ti**") the regulation set point is activated "**SP2**" with action **C**, when the input is open the set point "**SP**" is set to action **H**.
= -1, -2, -3, etc. – Identical functions to the above but with the inverse logical operation (normally closed contacts).

4.4 – OUTPUTS SETUP FOR RELAYS AND BUZZER

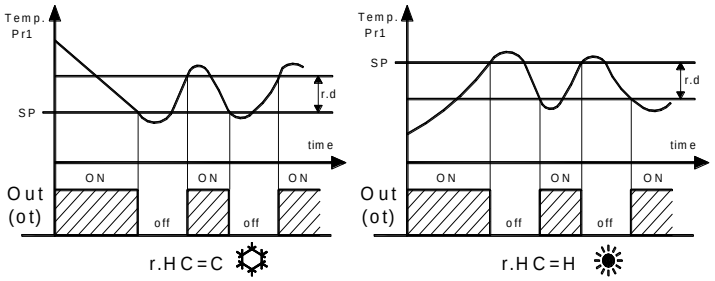
The outputs of the device can be configured via the parameters "**o.o1**", "**o.o2**" and "**o.o3**" with the following functions:
= Ot - Control compressor / solenoid or cooling element
= DF - Control of defrost heaters
= Fn - Control of evaporator fans
= Au - Output Control Assistant
= At - Allows control device Alarm "comparable" through the normally open and closed digital input for alarm. (See section Alarm)
= AL - Allows control device Alarm "non silenceable" through a normally open contact closed during alarm. (See section Alarm)
= An – To control an alarm silenced through a contact normally closed and open in alarm.
= -t – To control an alarm silenced through a contact normally closed and open in alarm when the instrument is turned on.
The output is disabled when the device is not powered or is in stand-by state. This mode can be used as display lighting, anti-fog resistance or other utilities.
= -L – To control a device alarm silenced by a contact normally closed and open in alarm.
= -n – To control an alarm device with memory function through a normally closed and open in alarm (see alarm memory).
= on – For control of the device to be activated when connected. The output remains off when the device is not powered or is in stand-by. This mode can be used as a way to illuminate the display case, anti-fog resistance or other utilities.
= oF – No function (Output Off)
If one of the outputs is configured as Auxiliary output (**= Au**) function must be configured in the "**o.Fo**" parameter and can be conditioned by the time set in the parameter. "**O.tu**". The "**o.Fo**" parameter can be programmed with the following functions:
= oF – no function
= 1 – Output delay regulation.
The auxiliary output is activated by the programmed delay in the "**o.tu**" parameter relative to the output configured as "**ot**". The output is deactivated when the output "**ot**" is deactivated. This type of operation can be used for control of a second compressor or a parallel control that is useful for the control process. Prevents booting two devices at once causing a high spot electricity consumption.
= 2 – Activation by front key ("**F**" or ⏻). The output is activated by pressing the key "**F**" or ⏻ configured as follows ("**t.UF**" or "**t.Fb**" = 1).
This setting has a bistable behavior, which means that pressing the button the first time, the output is activated while the second pulse is disabled. In this mode the output can be configured as an auxiliary off even when in automatic mode after a certain time tax on the "**o.tu**" parameter.
With "**o.tu**" = oF the activated and deactivated manually by pressing ("**F**" or ⏻), otherwise the dismount, once activated, automatically turns off after the set time. This operation can be used for example to control the chamber light, anti-fog resistance or to other utilities.
= 3 – Light up showcase and shade (function economy) connected to "Normal/SP2" mode. The output is activated when Normal mode is activated, whereas when in SP2 mode remains disabled.
= 4 – Internal cell light. The output remains off and turns on only if the digital input is configured as door opening ("**i.Fi**" = 5.6).
The par. "**O.bu**" lets configure the internal buzzer (if available) as follows:
= OF – The buzzer is disabled
= 1 – The buzzer is activated only to signal alarms
= 2 – The buzzer is activated only briefly to indicate that you have pressed a key (no indicates alarms)
= 3 – The buzzer is activated to signal alarms and when pressed a key.

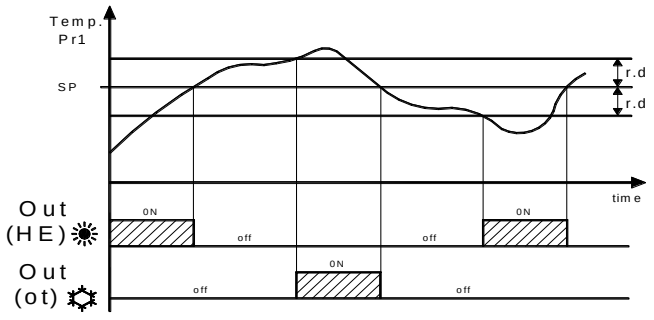
4.5 – ACTIVE SET POINT SELECTION

The computer program allows 2 types of Set point adjustment ("**SP**" and "**SP2**") and you can select which you want to activate. The function can be used in the event that it is necessary to switch two temperature (ex: day / night or positive / negative, etc.).
The active Set point can be selected:
-By "**S.SA**" parameter.
-Using the "**F**" / ⏻ key if the "**t.UF**" = 3. Parameter
-Use the key DOWN / AUX if "**t.Fb**" = 3. Parameter
-Using the digital input if par. "**I.Fi**" = 8 or 11.
It is recalled that the selection of the active Set Point can be combined with the function of the turn off Auxiliary output if used as a light showcase and up shade (**function economy**) with ("**o.Fo**" = 3) and mode switching action **Cooling / Saver** for the configured ("**i.Fi**" = 8) digital input.
The "**SP**" and "**SP2**" can be programmed with a value between the value programmed on par. "**S.LS**" and the value set to "**S.HS**".

4.6 – TEMPERATURE CONTROL

In the mode of regulation of the type device ON / OFF acts over outputs configured as "**ot**" and "**HE**" in the function of the extent of the probe **Pr1**, the active Set Point "**SP**" (or "**SP2**") , the intervention differential "**rd**" (or "**r.Ed**") and the operating mode "**r.HC**".
As to the mode of operation in programmed "**r.HC**" the parameter differential controller is automatically considered a positive value for a cooling control ("**r.HC**" = C) or a negative value for the heating control ("**r.HC**" = H).
In case that parameter comes programmed "**R.HC**" = nr **((NOTE !! the option "Neutral Zone" is only available in the TSF 200 BLUE C and F 300 RT models))** the output configured as "**ot**" acts with the cooling action (like "**r.HC**" = C) and can use a configured as "**HE**" acting out the heating action.
In this case the differential regulatory intervention is automatically considered a positive value for the cooling action and the negative value for the heating action.

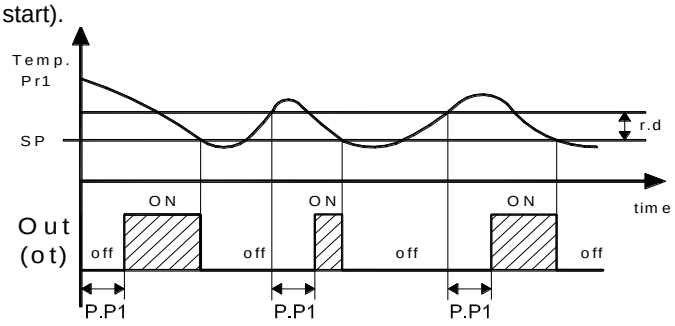




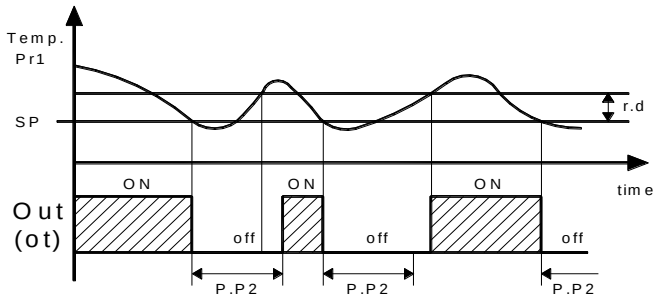
All protections set time in the next paragraph (P.P1, P.P2, P.P3) always and only output configured as "**ot**".
In case of probe error is possible to perform that the output configured as "**ot**" works cyclically time programmed on par. "**R.t1**" (activation time) and "**r.t2**" (deactivation time) during error.
When an error occurs the probe Pr1, the instrument comes with the activation of the "**ot**" exit time "**r.t1**" when disabled by the time "**r.t2**" and so on if the error remains.
When an error occurs in the probe Pr1, the device proceeds to activate the output "**ot**" for time "**r.t1**", proceeds to disable the time "**r.t2**" and so on while the error remains.
Programming "**r.t1**" = oF the output in probe error condition will always be off.
Programming instead of "r.t1" any value "r.t2" = oF the output in probe error condition will be always on.
Note that the operation of the temperature controller may be subject to the following function: "Protection of compressor and delay timer to" "defrost" open door "and" external alarm with lock out "with digital input.

4.7 – COMPRESSOR PROTECTION FUNCTION AND DELAY TO START

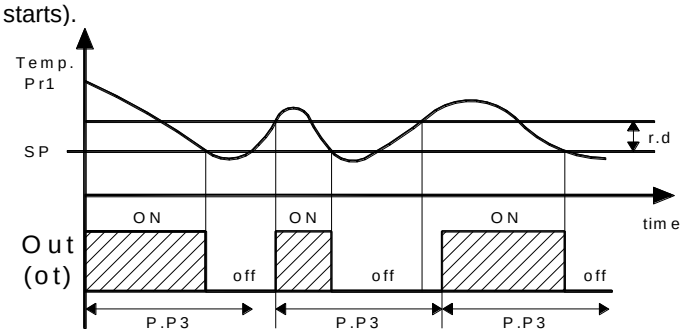
The compressor protection feature helps to avoid very frequent compressor starts or it can also be useful for control in time for the relay output to an actuator or intended load.
Activate this function provides 3 types of timing choices as appropriate to the regulatory system.
The protection is to prevent multiple starts during the time of protection.
The first provides a delay time to the activation of the output according to the time set in the "**P.P1**" parameter (delay to start).



The second time, foresee a delay on relay of control, in order to ensure a minimum time between the arrest and the progress of the relay parameter: "**P.P2**" (delay after stop or minimum downtime).



The third period foresee not allow starts if has not exceeded the programmed time between consecutive starts. Parameter "**P.P3**" (delay after consecutive starts).



During all phases of inhibition caused by protection, LED signals the activation of the regulation output (Cool or Heat) flashing.
You can also activate a delay to the start of the regulation when power arrives to the thermostat. The "**P.od**" parameter is useful when there are multiple thermostats, for not start loads at the same time and allowing a smoother power line or protect to power failures that prevent no discontinuous starts booting.
During this phase delay visualize **od** alternating the normal viewing programmed.
The timer function described is deactivated programming the parameter = **oF**.

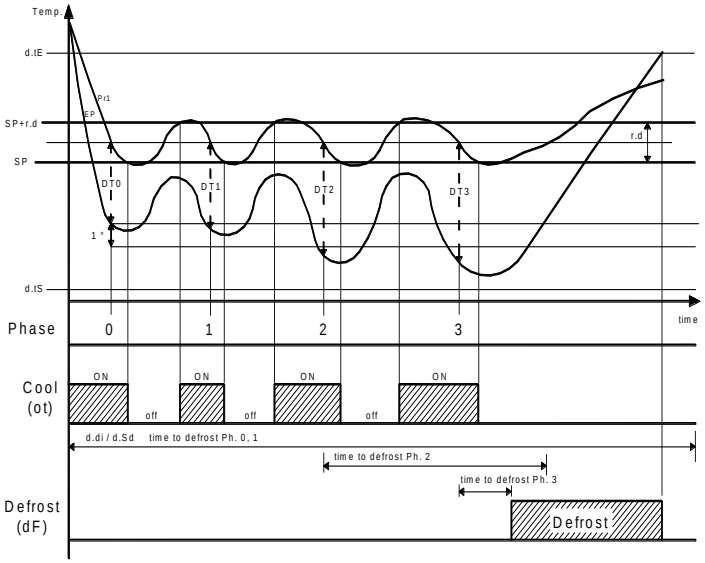
4.8 – DEFROST CONTROL

The control mode for defrosts acts on the output programmed as "**ot**" and "**dF**".
The type of defrost is set in parameters "**d.dt**" that can be programmed:
= EL – By ELECTRICAL RESISTANCE (or compressor stop): This modality in defrost mode has the compressor output "**ot**" off, while "**dF**" output is activated. Not using "**dF**" output will obtain defrost by stopping the compressor.
= in – HOT CYCLE GAS or INVERSION CYCLE: during defrost, output "**ot**" and "**df**" are enabled.
= no – NO FUNCTION OUTPUT COMPRESSOR: With this mode, during defrost output "**ot**" continues to work as a function of temperature controller while the output "**dF**" is activated).
= Et – ELECTRIC DEFROST THERMOSTATED: With this mode during defrost output "**ot**" is disabled, while "**Df**" output acts as a temperature controller of evaporator on defrosting.
This selection is end defrost by time ("**d.De**"). During defrosting, the "**Df**" output behaves as a control for temperature regulation, in heating mode with Set = "**d.Te**" and with fixed hysteresis of 1 º C and cooling the temperature measured by the evaporator probe set to probe (EP).

4.8.1 – AUTOMATIC START DEFROST

The defrosting is done automatically because the device is configured by time intervals.
Automatic defrost is obtained by programming par. "**D.Di**" time required between defrosts.
The first defrosting to connection of equipment can be programmed in par. "**D.Sd**".
This allows to do the first defrost on different interval seted in the parameter "**D.Di**".
If you want on device start, this perform a defrost cycle (provided that the conditions stated in the par. "**D.tS**" and "**d.tE**" indicated and described below) program the par. "**D.Sd**" = oF.
This allows defrost the evaporator always when they have frequent power outages that may cause cancellations in defrost cycles.
If you wish only standard rhythms between defrost cycles, set the value of "**d.Sd**" to value = "**D.Di**" to cancel the start defrosting.
Establishing "**D.Di**" = oF, the defrost at intervals are disabled (including the first, regardless of the time imposed in par. "**D.Sd**".
Through the "**d.Dc**" parameter is possible to set the mode of how the defrosting is done. The start mode of automatic defrosting is described below:
= rt – At intervals of real-time connection. Intervals "**D.Di**" are the account total time since the device turns on. This method is one of the more used in most refrigeration systems.

= ct – At time intervals of working compressor. Adding the partial operation times every X hours working will perform a defrost. This mode is used only in facilities positive temperature cold.
= cS – (atypical special regulation) to each compressor stop. Programming ("**D.Di**" = oF, defrosting is done only on stop the compressor).
= St – Defrost evaporator temperature. The device activated a defrost cycle when the evaporator temperature (probe set to EP) amounts below the value set in the parameter. "**D.tS**" or the end of time programmed in **rt** mode (if "**D.Di**" = oF defrost always done by evaporator temperature) This system can be used to defrost the evaporator used machinery such as pumps heat (in this case defrosting time intervals would be disabled) to ensure defrost if the evaporator temperature reaches well below that normally results symptoms of low thermal change from the normal operating conditions.
= dd – DYNAMIC REDUCTION DEFROST
This parameter is used in the so-called "**Dynamic Defrost**" in which the device reduces the time between defrosts if system conditions require.
By parameter "**d.dd**" = 0 .. 100% (**recommended 25% to 50%** values) program "**%**" to be reduced if the system requires cutting the time between defrosts.



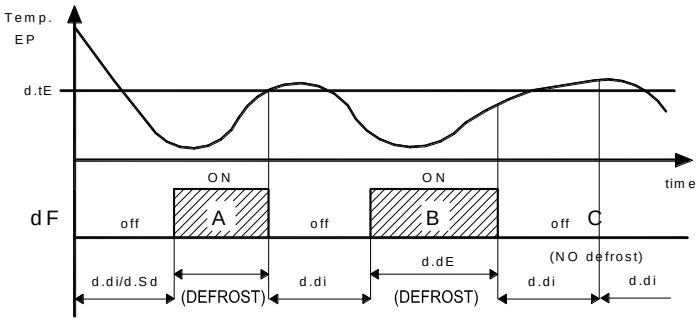
*Operation Example "**dynamic defrost system intervals**" with reduction "**d.dd**" = **30%** and end defrost temperature.*
The system anticipates the accumulation of ice leaving the battery in peak condition. This function operates when the output of cold is turned on and the temperature of the camera is in the **Set Point** + **rd / 2**, if the difference between the temperature of the chamber and the evaporator exceeds the reference value **DT0** by **1 ° C** or more, and the difference between the evaporator and chamber is superior to the last comparison, reduces the "**d.dd**" programmed value on time "**d.di**" or "**d.Sd**". To use this system it is recommended that the "**d.di**" parameter enter the longest possible time taking into account the proper functioning of the system. The advantage of defrosting at intervals is that it allows dynamic scheduling intervals longer than normal and defrost work so they are system conditions that determine whether the anticipated implementation defrost if necessary.
If the set time is too short you may not have time to act "**Dynamic Defrost**".
If the system is configured correctly, you manage to avoid many UNNECESSARY defrost and as a result ... **Energy Saving and Efficiency**.

4.8.2 – MANUAL DEFROST

To activate a manual defrost cycle press the UP / DEFROST key while the device is in operation and hold down for 5 seconds. If conditions are optimal for defrosting will be conducted, either evaporator probe par. "**D.te**" and "**d.ts**".
To cancel a defrost proceed to press UP / DEFROST button for 5 seconds.
The activation commands / stop of a defrost cycle can also be via the digital input.

4.8.3 – END OF DEFROST

The defrost cycle can be time consuming if the evaporator probe (probe set to EP) is used to achieve the temperature.
In case that it can not use the evaporator temperature, the cycle time will be established by the par. "**D.dE**".
If the evaporator temperature is used, the end of defrosting is when the temperature measured by this probe set to EP exceeds the temperature set by the torque. "**D.tE**".
If this temperature is not reached within the time fixed by the par. "**D.dE**" defrost does not terminate.
So if the temperature measured by the evaporator probe is higher than that imposed in par. "**D.tE**" defrosting is inhibited.
The defrost cycle is indicated by the led DEF. At the end of defrost to delay the restart of the compressor (output "**ot**") time set in par. "**D.td**" to allow the evaporator drip.
During this delay, the LED blinks to indicate DEF status finish drip.



***Example of end of defrost**: Defrost indicated as "**A**" ends up reaching the temperature "**d.tE**", the "**B**" part ends at the end of "**d.dE**" in terms of tempera "**d.tE**" is reached, the defrost "**C**" does not work when the temperature is above "**d.tE**".*

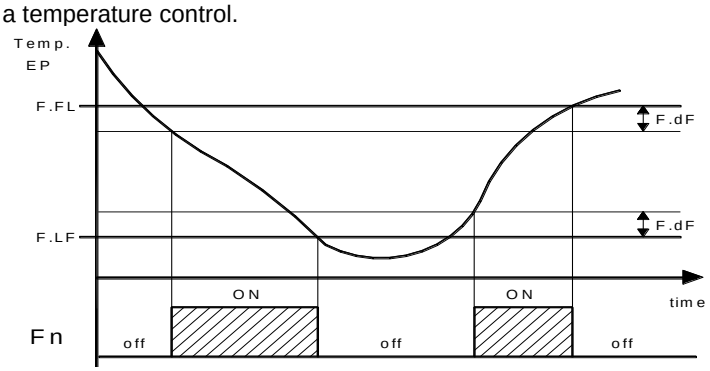
4.8.4 - DISPLAY LOCK ON DEFROST MODE

Using parameters "**d.dL**" and "**A.Da**" display behavior is established during defrosting.
The "**d.dL**" parameter causes blocking last temperature on the display before defrost ("**d.dL**" = on) until you reach the end of defrost and the temperature does not exceed below the value of the final temperature memorized or the condition ["**SP**" + "**r.d**"], or exceeds the safety time lock "**A.Da**".
Also allows visualization of the indicative initials Defrost "**dEF**" ("**dl**" = Lb) and after defrost the acronym "**PdF**" that indicates time defrost finish but cold temperature not recovered to control value ["**SP**" + "**r.d**"]) or exceeds the safety time lock "**A.Da**".
Another possibility is to indicate the actual temperature of the cold chamber or cabinet, during defrosting ("**d.dL**" = oF).

4.9 - EVAPORATOR FAN CONTROL

The evaporator fan control works for output configured as "**Fn**" function in certain states of the device and the temperature measured by the evaporator probe (probe set to "**EP**").
The parameters related to the fan control functions are in the " **Fn**" folder.
In the event that the evaporator probe is not used or is in error, the output configured as "**Fn**" is activated only in function of the parameters "**F.tn**", "**F.tF**" and "**F.FE**".
Using parameters "**F.tn**" and "**F.tF**" you can set the behavior of the evaporator fan when the control output configured as "**ot**" (compressor) is switched off.
When the output "**ot**" is off may cause the output configured as "**Fn**" continue to operate cyclically according to the times programmed in the "**Ftn**" parameter (activation time fan evaporator compressor off) and "**F.tF**" (time deactivation evaporator compressor off) fan. By stopping the compressor equipment evaporator fan can keep ignition time "**F.tn**", and disable the time "**F.tF**" when output "**ot**" remains disabled. Programming "**F.tn**" **Fn** = oF the output is turned off by stopping the output "**ot**" (evaporator fan off stopped functioning compressor or fan attached to the compressor).
Programming "**F.tn**" to any value and "**F.tF**" = oF the "**Fn**" output will remain active also disabling the output ot (active compressor off evaporator fan).

The "**F.FE**" parameter allows you to set if the fan has to be always on regardless of the state of the defrost ("**F.FE**" = on) or off during defrosting ("**F.FE**" = oF).
In the latter case it is possible to delay the restart the fan after completing defrosting, for the time set in the "**F.Fd**" parameter.
When this delay is activated the LED flashing FAN is set to indicate the delay in progress.
When the evaporator temperature is used for the fan, is conditioned by the parameters "**F.tn**" "**F.tF**" and "**F.FE**", and acts as a temperature control.



You can set the fan off when the temperature measured by the evaporator probe is higher than programmed in the "**F.FL**" parameter (temperature too high) or where it is less than the value programmed in the "**F.LF**" parameter (very low temperature).
Associated with these parameters is a programmable differential in the "**F.dF**" parameter.
Note: You must pay special attention to the proper use of the functions of fan control based on temperature as a typical application of a typical refrigeration evaporator fan stops for heat exchange.
It is recalled that the operation of the evaporator fan can be conditioned to the "**open door**" function of the digital inputs.

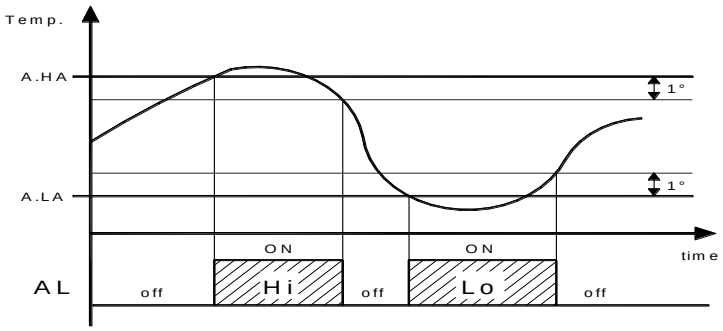
4.10 – ALARM FUNCTIONS

Alarm conditions controllers are:
- Probe Error: "**E1**", "**-E1**", "**E2**," **-E2**"
- Temperature alarm: "**Hi**", "**Lo**"
- External alarm "**AL**"
- Alarm door open: "**oP**"

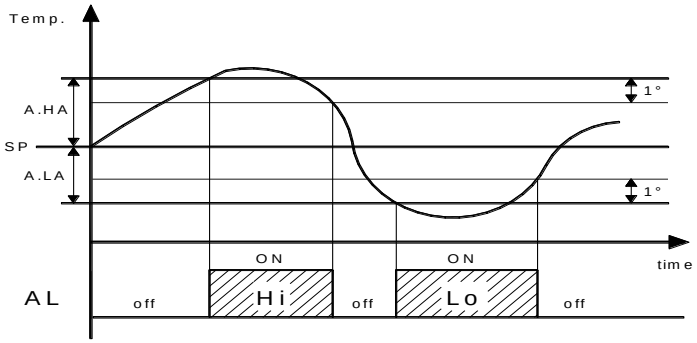
The alarm function is displayed the ALARM LED on the internal buzzer, set by the par. "**O.bu**" or on the desired output is set by par. "**O.o1**" "**o.o2**".
Buzzer sounds on alarm but can be disconnected the par. "**O.bu**" = 1 or 3, and after ringing can be deactivated by pressing a key. The alarm output can point to the following schedule settings of the output.
The possible selection of these parameters for the operation of alarm signal are:
= At – When you want the output to be activated in alarm condition and can be turned off (by keypad alarm) manually.
= AL – When you want the output to be active in alarm CONDITION but can not be turned off manually or is only when the alarm condition is cancelled. (Typical Application one bright signal).
= An – When you want the output to be active in alarm conditions and keeps on even if the alarm condition disappears (alarm memory) Deactivation (recognition memorized alarm) can be removed manually by pressing any key when the alarm is over.
= -At – When the operation described as "**At**" with inverse logic is desired. (output activated in normal condition and disabled in alarm status).
= -AL – When the operation described as "**AL**" but with function logic reversed is desired.(output activated in normal and disabled in alarm status)
=-An – When considering the operation described as "**An**" but with inverse logic operation (output activated in normal and disabled in alarm status)
The unit has the option of having the function of activating the alarm memory "**A.tA**" parameter.
If "**A.tA**" = Of the device cancels the alarm signal to alarm conditions cease, but if programed = On alarm conditions are also recorded but keeps flashing ALARM LED and indicates that an alarm was verified.
To cancel the alarm memory signaling just press any key.
It is recalled that if the operation of a memory alarm output (o = **An-An**) is desired, you must program the "**A.tA**" = on parameter.

4.10.1 – ALARM FUNCTIONS

The alarm function is a function of temperature reading from the probe, and the type of programmed alarm, parameter. "**A.Ay**" and the alarm set point, par. "**A.HA**" (maximum alarm) and "**A.LA**" (minimum alarm).
Through the "**A.Ay**" parameter you can specify whether the alarm set "**A.HA**" and "**A.LA**" should be considered absolute or relative to the active Set Point, whether to display in the message display **Hi** (High alarm) or **Lo** (low alarm) when entering alarm or not.
Depending on the operation by the par "**A.Ay**" considered can be programmed with the following value:
= 1: Absolute reference to Pr1 with visualization. Display (**Hi - Lo**)
= 2: Relative with reference to Pr1 visualization. Display (**Hi - Lo**)
= 3 Absolute concerning the probe Pr2 configured as "ancillary" to display. Display (**Hi - Lo**)
= 4: Relative reference to the probe Pr2 configured as "ancillary" to display. Display (**Hi-Lo**)
= 5: Absolute concerning Pr1 no display
= 6: Relative concerning Pr1 no display
= 7: Absolute reference to the "**auxiliary**" probe without display
= 8: Relative reference to the "**auxiliary**" probe without display
By some parameters may delay activation, if the situation is cancelled recovering optimal conditions, without becoming alarm. These parameters are:
"A.PA" – delay time the alarm to get power and turn on the regulation, in case you are in alarm.
"A.dA" – time delay after a defrost (A. maximum) or after a continuous cycle (A. Min).
"A.At" – delay time of the performance of temperature alarm.
Temperature alarms are enabled at the end of exclusion time and is activated after the "**A.At**" when the temperature measured by the probe exceeds or falls below the alarm thresholds respective maximum and minimum.
The differential alarm will be the same set in parameters "**A.HA**" and "**A.LA**" if alarms are absolute ("**A.Ay**" = 1, 3, 5, 7).



Or values ["**SP**" + "**A.HA**"] and ["**SP**" + "**A.LA**"], if alarms are relative ("**A.Ay**" = 2, 4, 6, 8).



Temperature alarms maximum and minimum may be switched off if we put in on parameter "**A.HA**" and "**A.LA**" = oF.

4.10.2 – EXTERNAL ALARM DIGITAL INPUT

The device can signal an external alarm in device by activating the digital input with the function programmed as "**i.Fi**" = 4 or 9.
Contemporaneously with the signaling configured alarm (buzzer and / or output), the device signals the alarm by activating the ALARM LED display and its display label AL alternately with the variable set in par. "**I.dS**".
The mode "**i.Fi**" = 4 does not operate with no action on the control output, while the mode "**i.Fi**" = 9 provides disabling all control outputs in the intervention of the digital input.

4.10.3 – OPEN DOOR ALARM

The device may signal a door alarm by activating the digital input with the function programmed as "**i.Fi**" = 5 or 6.
In activating the digital input the device indicates that door is open through viewing the display **oP** alternately with the variable set in parameter label. "**I.dS**".
After the delay programmed in par. "**A.oA**" the device notes the alarm through the activation of the configured device (buzzer and / or output), activating the ALARM LED is continuous with message display **oP**.
The intervention of the open door alarm is also reactivated when the output is inhibited (fan + fan or compressor).

4.11 – OPERATION OF KEY "F" ⏻ AND "DOWN / AUX"

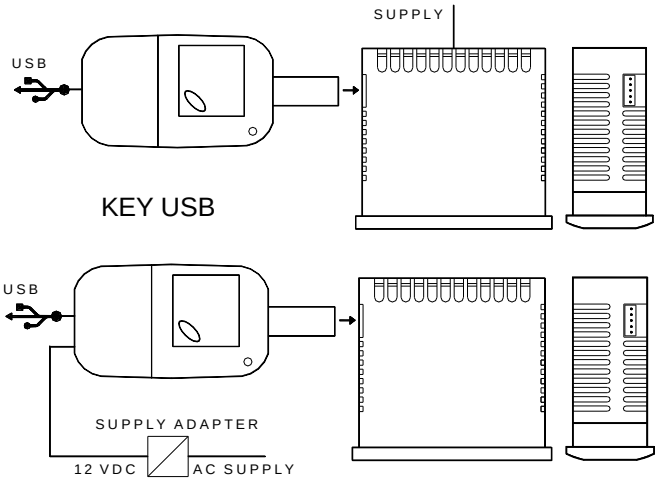
The key "**F**" or ⏻ is defined by the "**t.UF**" parameter while the keyboard function "**DOWN / AUX**" can be defined by the "**t.Fb**" the two parameter included in settings "**t**".
Both parameters have the same possibilities and can be configured for the following functions:
= OF - No Function
= 1 - Pressing the button for at least 1 second to turn on / off the auxiliary output from configuring ("**o.Fo**" = 2) parameter.
= 2 - Press the button for at least 1 second to enable / disable a continuous cycle.
= 3 - Pressing the button for at least 1 second, one of 2 set point stored in rotation is selected. After selection, the display will flash for approximately 1 second showing the value of the active set point (**SP** or **SP 2**)
= 4 - Press the button for at least 1 second instrument status from on to standby and vice versa is changed.

4.12 - ACCESSORIES

The device is equipped with a 5-pin connector for connecting an accessory described below.

4.12.1 – CONFIGURATION PARAMETERS WITH "USB KEY"

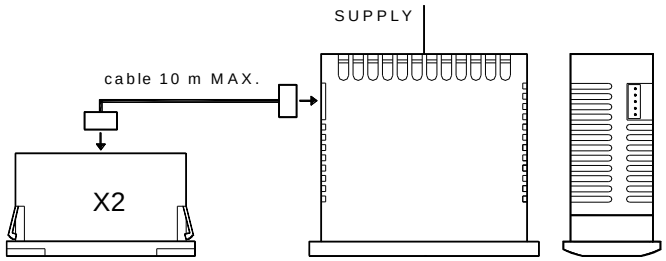
The device has a connector that allows you to transfer the operating parameters from the "**KEY USB**" device equipped with a 5-pin connector. The "**KEY USB**" device is used for serial programming of devices must have the same configuration parameters, or to save a copy of the programming device and to transfer it quickly. The device has a USB input, allowing connection to a PC, with which, through the software configuration "**Universal Conf**" or "**Osaka Set Up**" is possible to configure operating parameters.



For more information, see the "KEY USB" device manual.

4.12.2 – REMOTE VIEWING "X2"

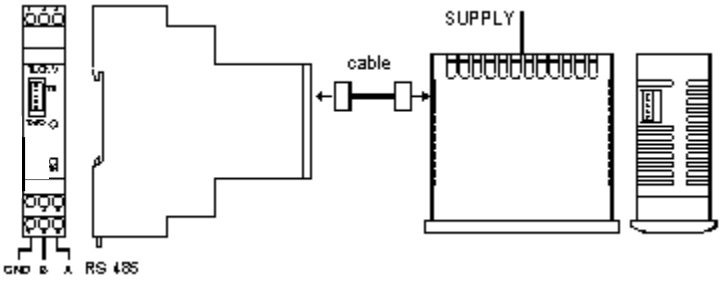
The device is possible to connect a remote display device via a cable X2 can be up to 10 m start. The X2 device is powered directly from equipment, displays temperature measured by the probe Pr1 by a 2-digit display and a half.



Refer to the user manual regarding X2 device for more information.

4.12.3 - RS485 SERIAL COMMUNICATION WITH "CONV-TTL RS"

Through RS CONV-TTL device can connect the device to your computer to a network serial RS485 that are integrated into other equipment (controller or PLC) and is directed to a personal computer used as plant supervisor communication.
The protocol software is suited to computer **MODBUS RTU** type widely used in several PLC and supervision programs available on the market.
If the equipment is used with CONV-TTL RS, program par. "**T.Ad**" device management.
Therefore put in this parameter, a different number than the others, from **1 to 255**.
The transmission speed (baud-rate) series is not adjustable and is fixed at 9600 baud.
CONV-TTL converter RS is powered directly from your device.



Consult the user manual on the CONV-TTL RS device for more information.

5 – PROGRAMMABLE PARAMETERS LIST

"S" parameters relative to the Set Point.

	Par.	Description	Range	Def.	Note
1	**S.LS**	Minimum Limit Set Point	-99.9 ÷ HS	-50.0	
2	**S.HS**	Maximum Limit Set Point	LS ÷ 999	99.9	
3	**S.SA**	Active Set Point	1 ÷ 2	1	
4	**SP**	Set Point 1	S.LS ÷S.HS	0.0	
5	**SP2**	Set Point 2	S.LS ÷ S.HS	0.0	

"i" Parameters for Digital Input and Probes

	Par.	Description	Range	Def.	Note
6	**i.SE**	Type of probe	Pt - nt	nt	
7	**i.uP**	Unit of measure and resolution (decimal point) C0 = ° C with resolution 1 ° F0 = ° F with resolution 1 ° C1 = ° C with 0.1 ° resolution F1 = ° F with 0.1 ° resolution	C0 / F0 / C1 / F1	C1	
8	**i.Ft**	Measuring filter	oF ÷ 20.0 sec	2.0	
9	**i.C1**	Calibration probe Pr1 (chamber)	-30 ÷ 30 °C/°F	0.0	
10	**i.C2**	Calibration probe Pr2 (Evaporator)	-30 ÷ 30 °C/°F	0.0	
11	**i.C3**	Calibration probe Pr3 (Auxiliary) **Only for **F 300** / **TSF 300** / **M3***	-30 ÷ 30 °C/°F	0.0	
12	**i.CU**	Visualization Offset	-30.0 ÷ 30.0 °C/°F	0.0	
13	**i.P2**	Probe function Pr2	oF – EP – Au – dG	oF	
14	**i.P3**	Probe function Pr3 **Only for **F 300** / **TSF 300** / **M3***	oF – dG – Au – Ep	oF	
15	**i.Fi**	Digital Input function: 0 = No function 1= Start of defrost 2= End of defrost 3= Continuous Cycle 4= External Alarm 5= Open door with lock fan 6= Open door with lock fan and Cold / Heat 7= Activation Auxiliary output 8= Active Set Point Selection (SP-SP2) 9= External Alarm with control output deactivation 10= Start/Stop (Stand-by) 11= Active Set Point Selection (SP-SP2) with inversion of control (HC)	-11/-10 / -9 / -8 / -7 / -6 / -5 / -4 / -3 / -2 / -1 / 0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 /11	0	
16	**i.ti**	Actuate delay function programmed on digital input.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
17	**i.dS**	Variable shown on the display: P1 = Chamber Probe Pr1 P2 = Evap. Probe Pr2 P3 = Auxiliary Probe Pr3 SP= Active Set Point oF = Display Off	P1 - P2 - P3 - SP - oF	P1	

"r" Parámetros de Regulación de Temperatura

	Par.	Description	Range	Def.	Note
18	**r.d**	Differential (Hysteresis) regulation	0 ÷ 30 °C/°F	2.0	
19	**r.t1**	Activation of the compressor relay if defective sensors.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
20	**r.t2**	Stop time of the compressor relay if defective sensors.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
21	**r.HC**	Operating mode: H = Heat (heat) C = Cool (Cool)	H – C	C	
22	**r.tC**	Continuous cycle duration (Turbo frost).	oF ÷ 0.01 ÷ 9.59 (h.min) ÷ 99.5 (h.min)	oF	

"d" parameters management "Defrost"

	Par.	Description	Range	Def.	Note
23	**d.dt**	Type of defrost: EL = Electric defrost or compressor stop In = hot gas defrost / reverse cycle no = compressor maintains regulation Et = thermostatic evaporator defrost	EL / in / no / Et	EL	
24	**d.di**	defrost interval	oF ÷ 0.01 ÷ 9.59 (h.min) ÷ 99.5 (h.min)	6.00	
25	**d.Sd**	Delay of defrost at start (oF = Allows defrost at start)	oF ÷ 0.01 ÷ 9.59 (h.min) ÷ 99.5 (h.min)	6.00	
26	**d.dE**	Maximum duration of defrost	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	20.0	
27	**d.tE**	Defrost end temperature	- 99.9 ÷ 999 °C/°F	8.0	
28	**d.tS**	Activation temperature defrost	- 99.9 ÷ 999 °C/°F	2.0	
29	**d.dC**	Trigger Mode rt = a whole time intervals ct = time interval for compressor operation cS = Defrost at each compressor stop St = Automatic Defrost Evaporator Temperature (d.tS) dd = Defrost a dynamic range	rt / ct / cS / St / dd	rt	
30	**d.dd**	Defrost in dynamic range	0 ÷ 100	50	
31	**d.td**	Compressor delay after defrost (drip)	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.secx10)	oF	

32	**d.dL**	Display block in defrosting. oF = Displays actual temperature. on = Displays the last measure Lb = Displays "dEF" defrosting and "PdF"	oF - on - Lb	oF	

"F" Evaporator Control Parameters (Fans)

Par.		Description	Range	Def.	Note
33	**F.tn**	Activation of the evaporator fan compressor off	oF ÷ 0.01 ÷ 99.5	5.00	
34	**F.tF**	Deactivation time compressor evaporator fan running	oF ÷ 0.01 ÷ 99.5	oF	
35	**F.FL**	Maximum temperature for blocking fan (PR2)	- 99.9 ÷ 999 °C/°F	2.0	
36	**F.LF**	Minimum fan blocking temperature (PR2)	- 99.9 ÷ 999 °C/°F	-50.0	
37	**F.dF**	Fan differential lock	0 ÷ 30 °C/°F	1.0	
38	**F.FE**	State fan during defrost	oF – on	on	
39	**F.Fd**	Fan delay after defrost	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	

"P" Compressor Protection Parameters

Par.		Description	Range	Def.	Note
40	**P.P1**	delay to start	oF ÷ 0.01 ÷ 99.5	oF	
41	**P.P2**	Delay after stop or minimum downtime	oF ÷ 0.01 ÷ 99.5	oF	
42	**P.P3**	Delay after the consecutive starts	oF ÷ 0.01 ÷ 99.5	oF	
43	**P.od**	Delay compressor start to energizing the instrument.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	

"A" Alarm Configuration Parameters

Par.		Description	Range	Def.	Note
44	**A.Ay**	Temperature alarm type: 1 = Absolute probe "Pr1" with visualization display (Hi - Lo) 2 = Relative probe "Pr1" with visualization display (Hi - Lo) 3 = Absolute probe "Au" with visualization display (Hi - Lo) 4 = Relative probe "Au" with visualization display (Hi - Lo) 5 = Absolute for "Pr1" no display on display 6 = Relative to "Pr1" without viewing display 7 = Absolute probe "Au" display no display 8 = Relative probe "Au" no display on display	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8	Ab	
45	**A.HA**	Set Point alarm for high temperature	oF / - 99.9 ÷ 999 °C/°F	OFF	
46	**A.LA**	Set Point alarm for low temperature.	oF / - 99.9 ÷ 999 °C/°F	OFF	
47	**A.Ad**	Differential temperature alarm.	0 ÷ 30 °C/°F	1.0	
48	**A.At**	Temperature alarm delay	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	
49	**A.tA**	Memory alarm.	Off-on	off	
50	**A.PA**	Alarm on delay at start	oF ÷ 0.01 ÷ 9.59 (h.min) ÷ 99.5 (h.min)	2.00	
51	**A.dA**	Delay of temperature alarm after defrost, defrost lock display.	oF ÷ 0.01 ÷ 9.59 (h.min) ÷ 99.5 (h.min)	1.00	
52	**A.oA**	Open door alarm delay.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	3.00	

"o" - Buzzer Outputs and Configuration Parameters

Par.		Description	Range	Def.	Note
53	**o.o1**	OUT1 relay configuration: oF = no function ot = Control temperature (compressor or solenoid) dF = Defrost Fn = Fan Au = Auxiliary A /-tt = Alarm Silenced AL /-L = Alarm not muted An /-n = preset alarm on = output activated when the device is running	oF/ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ -n/on	ot	
54	**o.o2**	OUT2 relay configuration: Similar "o1".	oF/ot/dF/ Fn/Au/At/ AL/An/ -At/ -AL/ -An/on	dF	
55	**o.o3**	OUT3 relay configuration: Similar "o1". **Only for **F 300** / **TSF 300** / **M3****	oF/ot/dF/ Fn/Au/At/ AL/An/ -At/ -AL/ -An/on	Fn	
56	**o.bu**	buzzer operation oF = off 1 = only for alarm 2 = keypad sound only 3 = enabled alarm and keyboard **Only for **F 300** / **TSF 300** / **M3****	oF / 1 / 2 / 3	3	
57	**o.FO**	Operating mode auxiliary relay output oF = No Function 1 = Check Out delayed 2 = Manual activation of keyboard or In. Dig. 3 = cabinet light with economy feature (enabled with "SP" standing with "SP2") 4 = internal light (door stop)	oF / 1 / 2 / 3 / 4	oF	
58	**o.tu**	Time relative to the auxiliary output.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 99.5 (min.sec)	oF	

"t" – Keyboard Configuration Parameters

Par.		Description	Range	Def.	Note
59	**t.UF**	Operation mode key "F" (U) oF = No Function 1 = Command auxiliary output 2 = Command Continuous Cycle 3 = Active Set Point Selection 4 = Start / Stop (Stand-by)	oF / 1 / 2 / 3 / 4	4	
60	**t.Fb**	Down key operating mode / Aux: see "t.UF"	oF / 1 / 2 / 3 / 4	oF	
61	**t.Lo**	Automatic keypad lock.	oF ÷ 0.01 ÷ 9.59 (min.sec) ÷ 30.0 (min.sec)	oF	
62	**t.PP**	Password access to the operating parameters.	oF ÷ 999	oF	
63	**t.AS**	Device address for serial communication MODBUS	0 ÷ 255	1	

6 – TROUBLESHOOTING, MAINTENANCE AND WARRANTY

6.1 – FAILURE WARNINGS / ERRORS

Error	Reason	Action
E1-E1 E2-E2 E3-E3	The probe can be interrupted (E) or short (-E), or measuring a value outside the allowable range.	Check the connection of the probe to the instrument and verify the correct operation of the probe. (it helps to have the values of the probes ohms)
Epr	Possible anomaly in EEPROM	Press Set button
Err	Memory error irreversible, disrepair device	Replace the product or sent for repair

Otras indicaciones:

Display Indicator	Reason
od	Delay-start after power equipment
Ln	keypad Locked
Hi	High temperature alarm in progress
Lo	Low temperature alarm
AL	Digital input alarm in progress
oP	open door
dEF	Active defrost, indication if "d.dL" = Lb
PdF	Defrost finish recovering cold if "d.dL" = Lb
CC	Continuous cycle in progress.

6.2 - CLEANING

Se recomienda de limpiar el Termostato solo con un paño húmedo sin detergente o con detergente neutro.

6.3 – WARRANTY AND REPAIR

This device has a guarantee in form of repair or replacement by manufacturing defects in materials of 12 months from the date of purchase.
OSAKA SOLUTIONS automatically void this guarantee and is not liable for any damages deriving from:

- Use, installation, or use and handling undue, others than those described above and, in particular, differs from the safety requirements established by the regulations.
- Use in applications, machines or electrical panels that do not provide adequate protection against liquids, dust, grease and electric shocks to the installation conditions made.
- The inexperienced handling, and / or alteration of the product.
- The installation / use in applications, machines or electrical panels do not comply with the valid norm.

In case of defective product under warranty or out of that period, it should contact the post sales service to perform the necessary steps. Request document repair "RMA" (by mail or fax) and complete it, is necessary send the RMA and the device to SAT OSAKA by method prepaid.

7 – TECHNICAL DATA

7.1 – ELECTRICAL FEATURES

Supply: 100...240 VAC +/- 10%
Frequency AC: 50/60 Hz
Consumption: 3 VA APROX.
Inputs /i: 3 inputs for NTC temperature probe (103AT-2, 10 K Ω @ 25 °C) or PTC (KTY 81-121, 990 Ω @ 25° C)
Relays Outputs: Up to 3 Relays

F 200 / TSF 200: OUT 1: 16A-AC1 (9A-AC3) / 250 VAC
OUT 2: 8A-AC1 (3A-AC3) / 250 VAC

F 300 / TSF 300: OUT 1: 16A-AC1 (9A-AC3) / 250 VAC
OUT 2: 8A-AC1 (3A-AC3) / 250 VAC
OUT 3: 5A-AC1 (2A-AC3) / 250 VAC

M3: OUT 1: 14A-AC1 (6A-AC3) / 250 VAC
OUT 2: 8A-AC1 (3A-AC3) / 250 VAC
OUT 3: 4A-AC1 (2A-AC3) / 250 VAC

Relay Output Electrical life: 100000 operations
Power supply: EN 60730-1 type 1.B
Overvoltage Category: II
Device Class: Class II
Insulation: (power 115/230 V and relay output); and part low voltage inputs; Electrically isolated between output and power

7.2 – MECHANICAL FEATURES

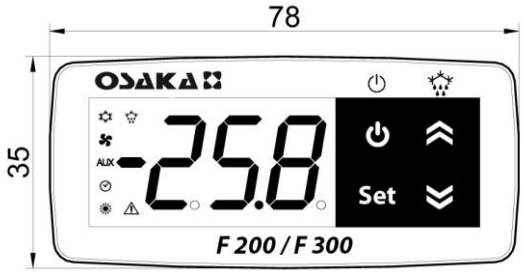
Body: Plastic self-extinguishing UL 94 V0
Category of resistance to heat and fire: D
Weight: 115 g approx.
Connection: Terminal block 2,5 mm2
Pollution Degree: 2
Ambient operating temperature: 0 ... 50 ° C
Operating humidity: 95HR% no condensing
Storage and transport temperature: -25 ... 60 ° C

7.3 – FUNCTIONAL FEATURES

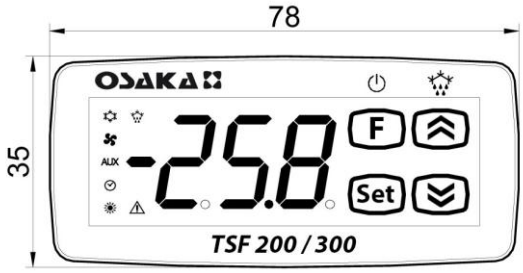
Temperature regulation: ON / OFF
Defrost control: interval for compressor failure.
Measuring range: NTC: -50 ... 109 ° C / -58 ... 228 ° F; PTC: -50 ... 150 ° C / -58 ... 302 ° F
Display resolution: 1 ° or 0.1 ° (between -99.9 ... 99.9 °)
Total accuracy: + / - (0.5% FS + 1 digit)
Time measured speed (no filter): 130 ms
Display: 3 Digits Reds (optional Blue) h 15.5 mm
Software class structure: Class A
Compliance: Directive 2004/108/EC (EN55022 class B, EN61000-4-2: 8KV air, 4KV cont; EN61000-4-3. 10V / m, EN61000-4-4: 2KV power, inputs, outputs; EN61000-4-5: com 2KV power mode, 1 kV \ diff mode, EN61000-4-6:.. 3V), 2006/95/EC (EN 60730-1, EN 60730-2-7, EN 60730-2 -9)

7.4 – MECHANICAL DIMENSION AND SUBJECTION

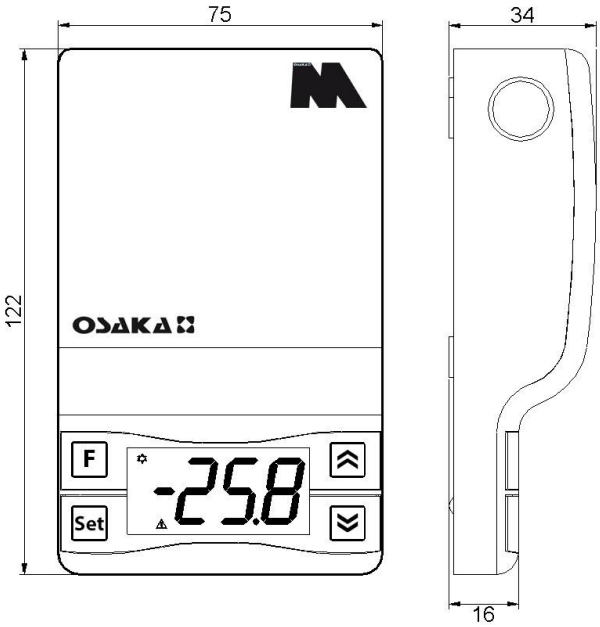
F 200 / F 300 Model



TSF 200 / TSF 300 Model



M3 Model



HOLES PANEL
- F 200 / F 300 / TSF 200 / TSF 300: 29 x 71 mm

ATTACHMENT
- F 200 / F 300 / TSF 200 / TSF 300: Side Clamps
- M3: Surface via screw

F 100

1 Input type PTC/NTC
1 Output Relay Control (Configurable)

- 32x74mm, 65mm deep
- Switching from 90…240 V - 50/60 Hz
- ON/OFF (Heat / Cool with defrost)

F 200

2 Inputs type PTC/NTC
2 Output Relay Control (Configurable)

F 300

3 Inputs type PTC/NTC
3 Output Relay Control (Configurable)

- Customize the colour of the front and display
- **Touch System** option. Models **TSF** (TSF 100 / TSF 200 / TSF 300)

NEW KEYBOARD IP

New Keyboard finest rubber, more comfortable and better touch response.
Incorporates new serigraphy for easy programming of equipment.
High degree of protection **IP65 - 67**.
Stand-By function hotkey (configurable).

NEW LARGER DISPLAY

New displays with a **30%** increase in the height of the digits.
Symbology cooling (Out / Fan / Def / Aux).
Provides greater visual range and clarity.

INTERNAL BUZZER

It incorporates an internal buzzer (buzzer).
This buzzer can be set as needed / application.
Alarms, keys, etc..

SIMPLE SYSTEM PROGRAMMING

Innovative system Simple Linear Programming "Initial" identifying the type of parameters to configure.
(I. Input, R. Regulation, A. Alarms).